하이브리드 복합재 철도차량 차체 적용 적층판의 충격특성 연구

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A Study on the Impact Characteristics of woven Cabon/Epoxy Laminates for the Hybrid Composite Train Bodyshell

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Key Words: impact damage(충격손상), residual strength(잔류강도), low-velocity impact(저속충격), compression-after-impact(충격 후 압축강도)

Abstract : Impact damages are very important in the perspective of residual strength of composite structures such as aircrafts, ships, and trains because those damages are sometimes not visible on the surface of the point of impact and the impact resistance of laminated composites is usually not so high. Thus, the impact characteristics of laminated composites should be investigated for the safety of composite structures. This paper investigates the low-velocity impact and compression-after-impact (CAI) characteristics conducted on woven carbon/epoxy laminates. Experimental results show that the energy absorption ratio and compressive residual strength greatly depend on the impact energy. The delamination shape of woven carbon/epoxy laminates was found to be circular.

세라믹/섬유강화복합재 적층판의 고속충돌 및 관통 해석

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Analysis of High Velocity Impact and Penetration on Ceramic/Fiber-Reinforced-Composite Laminate

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Key Words: Penetration mechanism(관통기구), Ceramic composite laminate(세라믹 복합 적층판), Analysis of high velocity impact(고속충돌 해석)

Abstract : Multi-layered laminate made of ceramic/composite have been developed to prevent penetration by high velocity impact. In this study, three-layered plates consisted of 1) cover layer (glass fiber reinforced polymer), 2) Al_2O_3 ceramic plate, and 3) backing plate (glass fiber reinforced polymer) were modeled to analyze their penetration resistance to high velocity impact. As the FEA tool, commercial LS-DYNA3D was used. The analysis results were compared with experimental data for which three-layered ceramic/composite laminates was tested using armor piercing projectile. The experimental data agreed well with the FEA result, and they showed effective ballistic protection.